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AN

Inaugural Dissertation

ON

Marsh Effluvia,

or the

Sources of

Autumnal Diseases.

BY

Benj.n Ellis.

March 8th,

1822.

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An Essay upon Marsh Effluvia or the Sources of Autumnal Diseases.

As connected with the sources of Autumnal Fevers I shall bring into view some of the prominent features of Vegetable Physiology.

It has been established by the experiments of Humbolt and other Philosophers, that plants derive their nourishment more from the elements of Animals and Vegetables, when liberated by the putrefactive process, than from the earth.

They are regularly organized bodies, and the organs of their systems decompose and assimilate to their own nature the water—

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of the earth, the gases eliminated by putrefaction, and the atmosphere which floats around them.

When the genial warmth of Spring extends itself over the face of creation, the sap rises from the roots and trunks of the trees and circulates through their wide spreading branches, and the lofty sons of the forest are again clothed with their leafy honours. Vegetable and animal putrefaction commences and the roots which serve the purpose of absorbents, drink in the result of this decomposition.

The meadows resume their carpet of green, and flowers of all hues serve to embellish the beautiful creation. Vegetable life flourishes while putrefaction goes on rapidly.

This state of things continues until the middle of summer, when the husbandman deprives the fields of their grain and grass, and stores his barn

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About this period, vegetation begins gradually to decline; the plants become sickly and their appetite for their destined food of course diminishes. Yet the heat and moisture of our climate continue to produce those elements which are favorable to the life of the vegetable kingdom, but destructive to the health and happiness of man; and this decline of vegetation is the harbinger of sickness to us.

It is said that plants through the medium of their leaves inspire during the day and give out a gas unfavorable to health in the night. The Carbonic acid gas which escapes from our lungs at every aspiration, falls by its gravity to the earth, is absorbed by the organs of vegetables and again becomes converted into living matter. They possess many other functions similar to the animal creation and destined for the same ends.

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Sexual intercourse is preserved among them and is necessary for their reproduction; and when all Nature sinks into the arms of sleep, the flowers of the field and the oaks of the forest take also their repose. Many plants are seen to shut their leaves & close their flowers when the sun sets.

Thus the vegetable creation which lends so much beauty to all the scenery of nature, not only supplies us with fruit for our food and nourishment, but by its wise organization absorbs the deleterious vapors from the atmosphere and drinks them in before they escape from the earth.

As Autumn approaches those persons situated in the vicinity of stagnant waters, and of rivers that have by evaporation left an uncovered marshy shore, begin to suffer from Intermittent & Remittent bilious fevers, Dysentery and all that train of diseases brought on by

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Miasmata floating in the Atmosphere.

These disorders disappear when the rigours of winter have checked this decomposition of vegetable and animal matter.

The endemic fevers of India as described by Dr. Johnson and others have no doubt their origin from the same sources. The Nile and Ganges which annually overflow their banks, carrying fertility and wealth to the wide vallies which they inundate, also scatter with a liberal hand the seeds of those diseases which are soon to bring destruction to the inhabitants.

The fevers of the West Indies depends upon the same causes. The dews are exceedingly pernicious in those climates, as well as in our own, bringing down in a concentrated form those noxious exhalations, which had been elevated by the Sun's rays into the upper regions of the atmosphere. The effect of-

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these dews is very perceptible upon those persons who sail from more northern latitudes, and incautiously expose themselves to their influence. The prevailing fever very soon makes its appearance among them. The first rains which fall in some parts of Africa after the sultry weather, as well as the dews are said to be so impregnated with a destructive principle that leather, cloth, and materials of that kind, when exposed for a short time to their action, pass into speedy decomposition, and clothes after such exposure being presented to the rays of the sun soon become covered with innumerable animalcula. The inhabitants are so well aware of this fact, that after having been wet by them, they plunge themselves into the first stream they meet with, or into the ocean; hence the popular opinion of dews being unhealthy seems to have a good foundation.

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Johnson relates that on the Arabian Coast, where the thermometer stood at 97° during the day, the evenings were cool, and the dews which fell were of a "perfectly salt and bitter taste", and that a very great difference was observed in the health of those crews of ships which were exposed to them, and those which were preserved from their action by shelter. The noxious exhalations from the marshes of that country produce bilious fevers of a highly malignant grade; the best remedies for which were found by Johnson to be venæ section pretty largely employed when called early, and repeated as often as the symptoms demanded; and after cleansing the alimentary canal, to induce the mercurial action as rapidly as possible. If this was once effected, the dangerous symptoms were generally arrested, the disease vanished before the impression of that powerful remedy.

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These Miasmata do not disseminate their influence to a very wide extent; tho a direct wind may waft them in so concentrated a form as to be productive of very serious consequences to those exposed to their action. They may also be interrupted in their course by thick and lofty forests, or by an elevated mountain. This experience in all Countries where they exist has fully proved.

Dr. Wistar used to say that he could observe a fog rising early in the morning from the Western Shores of the Schkll. near Philad.a and wafted by the prevailing S. W. winds extend itself in a N. E. direction, till it's course was interrupted by some rising ground, in the vicinity of the city, which presented a barrier to it's further progress. Here it's power became arrested and here too it's effects could be plainly observed by the increased number of Bilious and Intermittent fevers.

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A circle of diseases could almost be defined by observing the march of this destroyer.

There is a very decisive instance of the effects of woods in arresting the progress of miasmata, in the history of a disease which prevailed in Col: Howell's family. His residence was situated upon the shores of the Delaware and the banks of Timber Creek. To the East of the house was Eagle Cove; but between the house and this marsh which was inundated by every flood & left bare by every ebb tide, presenting at this time a surface covered with Vegeto-animal remains in a high state of putrefaction, was a thick and almost impenetrable forest of pine trees, so thick that the cattle with difficulty passed through it. This offered while it remained an insuperable barrier to the miasmata in their approach to the house, and for a period of 2 or 3 years after removing there the family en-

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enjoyed good health. At the end of this time, this out-post of their health and guards of their lives was sacrificed to gratify the eye with a more extended prospect; each echo of the axe proved the knell of the mournful fate which awaited them. When the forest had fallen the pale messenger made his appearance among them in the form of a highly malignant Remittent fever, a disease exceedingly insidious and fatal in its nature, suffering the constitution to appear little diseased for a few days, and then suddenly developing itself in the fulness and power of its awful form.

The number of persons more or less affected, including nurses, physicians, and friends amounted to nearly or quite seventy; several of this number died.

Very rainy seasons by covering the marshes with water, or very dry hot seasons by rapidly evaporating the miasmata

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and retaining them in the upper regions of the atmosphere are both favorable to health. But marshes by being partially evaporated and their shores kept constantly moist by falling rains, subjected at intervals to the direct and powerful rays of a summer sun, are certainly, the most prolific source of fever, which disease appears to be the great outlet of human life. The countries of the Eastern Hemisphere as Bengal and Egypt, are more subject to diseases of a high grade annually than we are. To quote the beautiful language of Dr. Johnson (whose work stands among the first records of medicine, for chaste and classical style, sound and penetrating thought, as well as bold and decisive practice): "In so luxuriant a climate as that of Bengal, and so fertile an alluvion as the Delta of the Ganges, we may well suppose, that every spot, almost every particle of

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matter, teems with animal as well as vegetable life. As the scale of existence descends in the animal kingdom, the amazing circle of reproduction and decay is perpetually trodden by myriads of animated beings, whose ephemeral vitality has scarcely commenced before it closes again in death; no sooner has the vital spark, the "divina particula aura" deserted its tenement of clay, than the latter is resolved by the heat and moisture into its constituent materials, and formed without delay into other compounds;

"With ceaseless change the restless atoms pass
From life to life a transmigrating mass".

The lowlands shores of the Nile present the same state of things, and in that lands where fertility and wealth are diffused by its inundations, the pestilence that "walketh at noon-day and wasteth in darkness" holds his pale sceptre

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over the lives of men. Here the plague oftentimes commences its march & allitrary away. But how shall we account for the extension of this epidemic over wide districts of country? The foundation of contagion has by modern experience & close investigation been rendered rather precarious. Dissections were carried on by the French and English surgeons during the campaign of Napoleon in Egypt, under proper precautions with impunity. The yellow fever of our own country too, in a pure atmosphere and cleanly apartments is not communicated from one individual to another by contact. An apartment may become no doubt by having several persons confined in it with the fever, so saturated with human effluvia as to produce a malignant disease. But under opposite circumstances we are not acquainted with a case that was purely the result

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of Contagion. Must we not resort then to a pestilential state of the atmosphere, aided by local causes to account for the diffusion of some of these scourges of mankind? What gave rise to the spotted fever, as it was termed of the United States? Commencing in New Hampshire it extended itself over the whole of the Eastern section of our country and came as far South as Philad^a. The spring opening soon after it's arrival here, it's progress was arrested; but when winter again held the frozen sceptre it renewed it's march to the South and West, carrying destruction in it's course to numbers of the inhabitants. An epidemic so universal could not be traced to contagion, and the usual sources of Autumnal fevers were locked up in adamantine chains of frost. We have then no other source to trace it to than some morbid constitution of the atmosphere, produced by the hidden and

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inexplicable operations of Nature.

The influenza too which has once or twice visited us seems to depend upon some derangement of the air we breathe.

Different causes have been assigned for the sickly state of the air in every age by different Physicians and Philosophers.

Some of the ancients supposed it arose from the prevalence of certain winds and peculiarities of season; others that a very subtile aura was exhaled from the bowels of the earth; and Webster a philosopher of the present day supposes it is caused by the Electricity which surrounds and penetrates our globe.

He considers the Electricity to be influenced by the approach of Comets, and enumerates a variety of instances wherein Comets, earth-quakes, volcanoes, & pestilential periods were succeeded or accompanied by each other. Admitting these statements as true, they shed but a feeble

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ray of light upon the dark path which would lead ~~them~~ to the ultimate source of all epidemics. This is one of the arcana of nature into which the finite powers of the human mind will probably never be able to penetrate.

Many other causes of endemic diseases are recorded, all depending however upon the decomposition of vegeto-animal matter.

The crews of ships are said to have suffered from an epidemic, the timbers of the vessel having been green. Such was the effect that the hammocks adjacent to the sides, mouldered & decayed. This may be the cause at times when fomites, contagion &c are charged with having produced a disease, that attacked the sailors and all those who visited the vessel.

There is a disease prevailing on the shores of the Schuylkill which commenced principally with the intermittent type

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a few cases of the remittent only occurring; but the disease has now assumed the shape of the latter principally. It has continued for 6 or 7 weeks; but has in very few cases terminated fatally. The lancet is rarely demanded, the fever having a strong tendency to assume the typhoid type. This epidemic extends from near Philad.a to a great distance up the river. It is thought by many persons to the dams which are erected on the Schuylk.l for the purpose of rendering the stream navigable. These may no doubt have considerable influence upon the surrounding atmosphere, as they must collect a great quantity of mud in their bottoms, which contains much vegetable and animal matter; but the season has been extremely warm and dry. The river has consequently been very much evaporated & left its shores covered with grass, mud and stagnant water, exposed to

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nant with poison and exhaling its pestif-
erous breath upon the air we breathe.

There extends also for a considerable
distance from the shore, a fungous veg-
etable substance, which grows in very
thick masses, so as in some places al-
most to impede the course of a boat.
This when cut up by the river craft exha-
led a very disagreeable effluvia. Grass
grows in some of the ponds, and as veg-
etables depend for their life and support
upon the decomposition of their kindred sub-
stances, there must be much food for them
generated beneath the water by the heat of
the sun. This grass perishes and undergoes
a similar process of decomposition. Since
a flood which took place about the first of
September, the disease has very much in-
creased. The river afterwards became very
low, and its shores were left in a swampy
state. The sun playeed upon a surface fertile

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with disease, & produced Intermittent and Remittent fevers in abundance. French Creek which empties into the Schuylkill is rendered stagnant not far from its mouth by a dam which keeps its shores a constant marsh covered with spatter docks. It is a fine hot-bed for disease & some of the most dangerous cases are directly upon its banks. The winds have blown from the South and South East most of the time since the disease began its ravages, and from their rarefying influence the miasmata have been rendered more extensive. The men engaged upon both sides of the River at the Canal have suffered from the disease. The fresh dug earth may probably have a deleterious influence on the health of the workmen. But their exposed situations lying upon straw under cabins that will neither protect them from wind nor rain, drinking immoderately of rye whiskey and remaining a long time

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in the evening air, when the dew is falling which in this place is very "heavy and chill" predisposes their constitutions to the action of the miasmata. The seeds of the disease may remain for several days dormant in the system, and only require an exciting cause to bring them into action. A man who had worked two weeks on the canal left there for Philad^a in good health; but before he arrived at Norristown 10 or 12 miles distant was attacked with a paroxysm of intermittent fever. The fatigue occasioned by the walk gave an opportunity for the disease to develop itself.

It is a singular fact that the catfish which inhabit this river in great abundance, have died in shoals along the stream for a considerable distance. We find recorded in Webster and other authors, that such circumstances are not uncommon during pestilen

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pestilential periods. The effect must depend upon some deleterious influence having been communicated to their natural element.

It cannot be proved that the dams are the cause of all the mischief which prevails; because at this place, about twenty five miles from the city, there are and have been perhaps a greater number of cases concentrated than any where below for the same distance; and there is no dam within many miles of this place (i.e. French Creek). The diseases which have prevailed upon the shores of other large streams last summer & this fall go to confirm the opinion that the dams are not the sole cause of these endemics. On the borders of the Susquehannah a disease has prevailed of considerable malignancy. At Lewistown on its West branch a bilious fever of a high grade has carried off many of the inhabitants. So great was the aerial poison, that strangers remaining there

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but one night were seized with the disease and in a few hours brought to the brink of the grave. It is not only upon the shores of rivers that fever of different types is prevailing; in the interior of the country in remote parts of the United States these diseases extend themselves. Wrightsville on the Susquehannah, a small village, has been so very unhealthy, that the inhabitants were finally unable to provide for themselves the necessaries of life.—

In the interior of Chester County a fever having a strong tendency to assume the typhoid type has existed which carried off many of the inhabitants & brought others into the most imminent danger.

This circumstance with others seems to add strength to the idea that a morbid constitution of the air does at times exist, and that it has a powerful influence in assisting local causes, to produce our epidemic and endemic diseases.

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I might now perhaps with propriety enter upon the subject of human effluvia: but as this is so intimately connected with the doctrine of contagion, I shall touch but lightly upon it. This subject has at different periods of the world occupied all the energies and talents of medical men. It has been upheld and abandoned as the change of opinions inclined either party triumphant. Time only can solve the problem.

It is a well known fact that several persons laboring under the effects of some morbid impression when confined in a close apartment, and not having that attention paid to cleanliness and ventilation which is always demanded, will exhale such an effluvia from their bodies as to infect the atmosphere of the room in which they are situated, and thereby communicate a disease to persons visiting them or to their attendants.

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The same result will ensue if persons in good health were to lie shut up in a close apartment, and filth suffered to accumulate. In proof of this assertion, numerous instances might be related of fevers that have originated in jails, hospitals, and ships, where no other cause could be discovered than the vitiated atmosphere arising from the concentration of human exhalations and the accumulation of excrementitious matters. Those unfortunate prisoners who were confined in the Black Hole of Calcutta died a dreadful death from the air becoming loaded with Carbonic Acid Gas and the effluvia of their bodies!

As a conclusion to this imperfect essay upon the sources of Autumnal diseases, I will offer a few prophylactic remarks, which may be of more practical importance than speculations upon their causes; the nature of which will only be discovered

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by the light which the unceasing evolution of time pours upon the paths of philosophy.

As the first step therefore, all masses of vegeto-animal remains in a state of decomposition should be immediately removed, and deposited in some place where they will be innocuous to health. Small marshes near dwelling houses should be drained. Cellars kept perfectly dry and the temple of Cloacina never suffered to become offensive by accumulation, will tend to preserve the health of families. Groves interposed between houses and marshes aught to be sacredly guarded, as they will often times arrest the progress of the miasmata to the mansions of the owners. Dwellings shaded by some branching trees from the direct rays of the sun will be less liable to have sickly inhabitants than if the heat plays upon their roofs all day. We have therefore not only the inducement

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of ornament but of health for surrounding our houses with trees. Some vegetables which are not killed by the first frosts, would answer a very good purpose by being planted in the fields adjacent to the house; such as Corn, potatoes &c – as they absorb the super-abundant miasmata floating in the air. A family were once preserved from an endemic in a section of this State by the Datura Stramonium growing in great abundance round the dwelling. This plant is not to be recommended as a preventive and probably its beneficial existence at this time was the result of idleness. Houses which must necessarily be in the vicinity of mill ponds, marshes &c – besides these barriers to disease, should be erected on the west side of such places; As the wind generally blows during the summer months in this country from the S. and S. W. and would consequently waft the

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exhalations of these ponds and fens directly from a dwelling thus situated and as certainly towards one placed in the opposite direction.

The inhabitants of such districts of country should be very particular as to cleanliness. Frequent bathing in cold water not only purifies the body, but gives energy and tone to the system, and fortifies it against morbid impressions. If the water cannot be borne cold, it may be warmed, for if below the temperature of the system, it imparts a tonic effect, tho. to the touch it may seem warm and pleasant. The exterior clothing may be light, though flannel should be worn next the skin. The windows of bed-rooms facing the marsh should not be left open at night, and the evening air and falling dew should be particularly avoided, also the air of the morning before the sun has risen

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to such a height as to dispipate the fogs & vapors accumulated during the night.

The food and drink should be taken in moderate quantities in order to preserve the digestive organs in a sound and healthy condition. The best beverages are water and fermented liquors. Where porter and ale cannot be commanded by the poorer class, a very good substitute may be found in ginger tea made strong and warm. The morning dram which is but the prelude to drunkenness should be reprobated by every friend to mankind and his country. Vegetables which are much eaten during the summer and particularly those disposing to flatulency should receive a plentiful supply of condiment. During the campaign of Napoleon in Egypt the French and English armies suffered severely from dysentery and other diseases of the alimentary canal, but the former much less than the latter,

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because their surgeons took the precaution to supply them daily with a quantity of cinnamon, and other spices, which were eaten with their foods, and counteracted the debility which all warm climates have a tendency to produce on the organs of digestion.

Thus have I travelled over an extensive and fertile surface, and without the torch of experience attempted to explore a subject copious with matter, and holding out the prospect of a rich harvest to the assiduous cultivator and investigating mind.

But the nature of this essay would not admit of its being lengthened much further; neither would the limited knowledge of a candidate for a medical degree, warrant his hazarding a theory built upon his own speculative ideas, and the facts accumulated by the labour of others.

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my heedless steps have no doubt passed by many a valuable flower and crushed others that would have ornamented and enriched my page.

But I have the satisfaction of believing, that I have done the best my times and opportunities would admit.